IV.B EXTRACTIVE RESOURCES

В. **EXTRACTIVE RESOURCES**

INTRODUCTION 1.

Resource extraction is the removal of natural resources from their place of discovery. The primary extractive resources in San Joaquin County are sand, gravel, and natural gas. Peat soil, placer gold and silver are also extracted from the County to a lesser extent. Other resources which have been extracted in the past include coal, clay, and manganese ore, all of which have been mined in the southwestern portion of the County. Extractive resources are considered non-renewable resources, since it can take from decades to thousands of years for the resource supply to be replenished by nature.

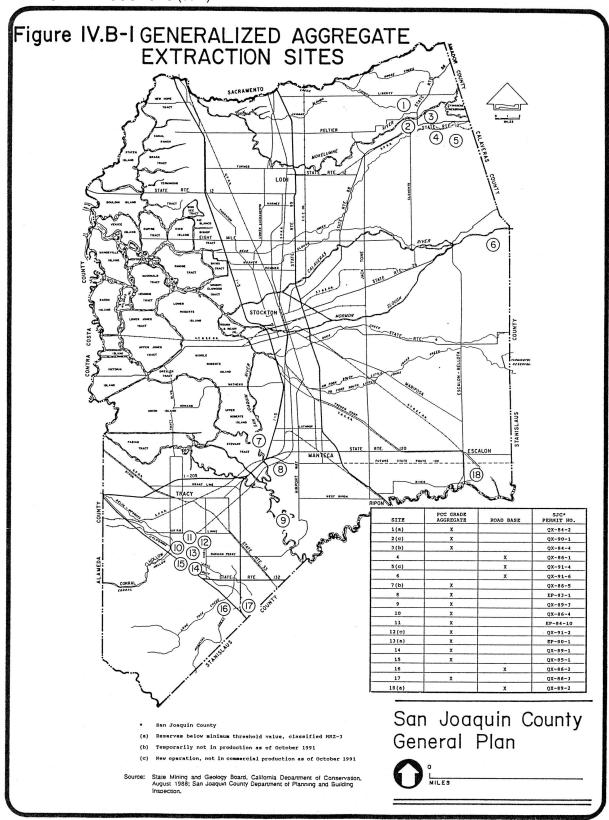
2. SAND AND GRAVEL

Land Use Characteristics. Sand and gravel extraction is usually an isolated activity involving large land areas and large-scale alteration of the landscape, often resulting in disruption of plants and animal habitats. The State requires that sites be reclaimed--that is, returned to productive use. Most of the County's reclaimed excavation sites are used for agriculture. One exception is Oakwood Lake, which has become a commercial recreation area.

Location and Quantity. Known sand and gravel deposit areas are shown on Figure IV.B-1. The principal areas of sand and gravel extraction activity in San Joaquin County are in the southwestern portion of the County in the Corral Hollow Creek alluvial fan near Tracy and along the Mokelumne, Calaveras, and Stanislaus Rivers in the eastern portion of the County. There are four areas, referred to as sectors, containing regionally significant deposits of high-grade aggregate (sand and gravel) in the County.

The total amount of aggregate resources, excluding the sand deposits in Sector D, is approximately 584.2 million tons. There are a total of approximately 78.9 million tons within these aggregate deposits that are permitted for mining (reserves). Total aggregate resources for the sectors are listed in Table IV.B-1. Sector A, located in the Corral Hollow Creek alluvial fan, is the major construction aggregate production district in the County. Over 80 percent, approximately 482 million tons, of the aggregate material consumed in the region is produced from this deposit.

The demand for sand and gravel comes from a variety of markets, but the most significant markets are for asphalt and concrete. Table IV.B-2 shows the production of sand and gravel in San Joaquin County and California since 1972. Sand and gravel reached a peak for both San Joaquin County and California in terms of the tonnage extracted in the year 1979. Production of sand and gravel reached its highest value in 1986, with nearly four million tons of aggregate produced in San Joaquin County yielding a value of \$15.6 million.²



Potential Hazards. The extraction of sand and gravel can result in several problems and hazards. First, the resources may be located in the same vicinity as other land uses that make it difficult or impossible to excavate the resource when it is needed. Secondly, conflicts often arise in determining the "best" use of the land. For example, sand and gravel deposits are often located in prime agricultural areas, in sensitive plant or animal habitats, or in recreational areas. The extraction activities can disrupt or eliminate these amenities. Mining is often characterized by noise, dust, vibrations, and visual blight which make them undesirable neighbors. Finally, inadequate reclamation efforts after the sites are closed can leave the landscape pitted and scarred. To help alleviate some of these adverse impacts and to insure proper reclamation of mined sites, the County exercises regulatory/enforcement authority, as described below.

TABLE IV.B-1: TOTAL AGGREGATE RESOURCES FOR SECTORS A, B, C, AND D

<u>Sector</u>	Total <u>Acres</u>	Acres <u>Permitted</u>	Reserves (tons) ¹	Resources (tons)
Α	2,834	820		481,900,000
В	1,237	0		64,600,000
С	879	38		37,700,000
Subtotal	4,950	858	78,900,000	584,200,000
D (sand only)	884	161		90,200,000
Grand Total	5,834	1,019	78,900,000	674,400,000

¹ Breakdown by sector not available.

Source: California Department of Conservation, Division of Mines and Geology, Special Report 160, 1988.

Regulations and Controls. In 1975 the California State legislature enacted the Surface Mining and Reclamation Act (SMARA) to ensure that:

- Adverse environmental effects are prevented or minimized and that mined lands are reclaimed to a usable condition which is readily adaptable for alternative land uses.
- The production and conservation of minerals are encouraged, while giving consideration to values relating to recreation, watershed, wildlife, range and forage, and aesthetic enjoyment.
- Residual hazards to the public health and safety are eliminated.³

TABLE IV.B-2
PRODUCTION OF SAND AND GRAVEL IN SAN JOAQUIN COUNTY AND IN CALIFORNIA

	SAN JOAQU	SAN JOAQUIN COUNTY		CALIFORNIA	
<u>Year</u>	Quantity (tons)	<u>Value</u>	Quantity (tons)	<u>Value</u>	
1972	2,360,000	\$ 3,033,000	117,288,000	\$162,619,000	
1973	2,083,000	3,403,000	117,470,000	176,286,000	
1974	2,794,000	5,624,000	105,191,000	176,213,000	
1975	1,908,000	4,384,000	88,445,000	168,248,000	
1976	2,751,000	6,615,000	95,592,000	202,272,000	
1977	3,231,000	8,608,000	109,135,000	250,951,000	
1978	3,300,000	9,325,000	115,100,000	281,400,000	
1979	3,927,000	11,893,000	129,348,000	347,385,000	
1980	3,479,000	11,395,000	116,426,000	381,005,000	
1981*	Not Available	Not Available	107,200,000	352,100,000	
1982	1,841,754	6,967,116	81,147,000	270,995,000	
1984	2,759,369	10,681,165	102,419,611	360,427,052	
1986	3,735,155	15,577,097	128,406,902	498,455,690	

^{*} Because of a change in the Department of the Interior's data canvassing procedures in 1981, no County sand and gravel data will be available for odd-numbered years.

Source: U. S. Department of the Interior, Bureau of Mines, Reno, Nevada

The SMARA also requires that the State Geologist identify and classify mineral areas in the State and that the State Mines and Geology Board designate mineral deposits of regional or statewide significance. These areas are to be classified as one of four Mineral Resource Zones (MRZ) or as a Scientific Zone, as described in Table IV.B-3. After the mineral classification information is received, mineral resource management policies must be incorporated into the General Plans of cities and counties. These policies are to support mining operations, including dredging and quarrying, and are intended to ensure that mineral resources will be available when their development is necessary or economically feasible. The mineral deposits in San Joaquin County have been identified and classified by the State Geologist in Special Report 160, issued August 1988. Figure IV.B-1 identifies aggregate extraction sites available for commercial use in the County. Regionally significant and potentially significant construction resource areas (sand and gravel) MRZ-2 and MRZ-3 areas are identified in Figure IV.B-2.

TABLE IV.B-3: MINERAL RESOURCE AND SCIENTIFIC ZONES

MRZ-1: Areas where adequate information indicates that no significant mineral deposits are

present or where it is judged that little likelihood exists for their presence.

MRZ-2: Areas where adequate information indicates that significant mineral deposits are present or

where it is judged that a high likelihood for their presence exists.

MRZ-3; Areas containing mineral deposits the significance of which cannot be evaluated from

available data.

MRZ-4: Areas where available information is inadequate for assignment to any other MRZ zone.

SZ: Areas containing unique or rare occurrences of rocks, minerals, or fossils that are of

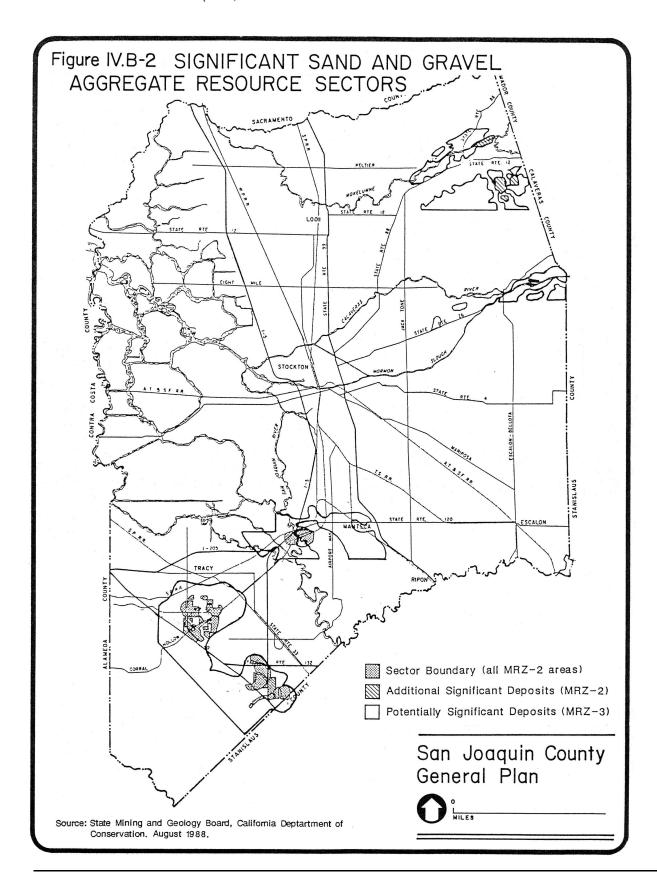
outstanding scientific significance shall be classified in this zone.*

Source: <u>Guidelines</u>, Title 14, California Administrative Code, Chapter 8, Subchapter 1, Article II, Section (2).

Future of the Industry. According to the State Mines and Geology report, the County will need 281 million tons of aggregate during the next 50 years, based on the current per capita aggregate consumption rate of 8.5 tons per year and Department of Finance population projections. Of this projected demand, approximately 40% (113 million tons) must be high-grade aggregate. The largest supplies of sand and gravel in the County are the Corral Hollow area near Tracy. The 79 million tons of aggregate reserves calculated to exist within this region represent 28% of the projected demand for all aggregate over the next 50 years. Unless new resources are permitted for mining, or alternative resources are utilized, existing reserves will be depleted by the year 2004. If a major earthquake, or similar unforeseen catastrophic event strikes the region and necessitates reconstruction, existing reserves would be depleted sooner.⁷ The deposits could last for longer than projected if excavators are granted variances permitting excavations below 90 feet; however, such excavations would reach the groundwater table.⁸

Without adequate planning and protection of future sources of aggregate in this region, it may be necessary to seek alternative sources of construction materials. Alternative sources of aggregate are available in other adjacent locations in the San Joaquin Valley, the lower Sacramento Valley, and in the San Francisco Bay Area. The nearest adjacent supplies are those produced in southern and eastern Sacramento County, the lower Stanislaus River east of Modesto, and in Pleasanton. However, permitted aggregate resources in these areas only remain available to meet short-term needs. Long-term shortages of material are expected to occur if additional deposits are not permitted. In addition, several major production areas in the San Francisco and Sacramento areas have been or are near depletion.⁹

^{*} No such areas are known to exist in San Joaquin County.



If current sources of construction aggregate were depleted or become unavailable, there are potentially substantial deposits classified MRZ-3 in the foothills in eastern San Joaquin County, though the quality and quantity of material is unknown. Not all sand and gravel deposits may be feasible to excavate. Many factors determine feasibility, including market demand, competition, ease of excavation, and the quality of the resource. Transportation costs are important and usually prohibit long distance hauling of the resource. Deposits which are close to developing areas should be utilized to the fullest extent possible and protected from incompatible uses.

3. NATURAL GAS

Land Use Characteristics. Natural gas is withdrawn through wells from subsurface fields, and there is little disruption or interference with other surface land uses. Agricultural fields cover most gas reserves in the County, although there exists a potential gas field beneath Stockton. Figure IV.B-3 shows existing active and abandoned natural gas fields.

Location and Quantity. Natural gas has been extracted from San Joaquin County since 1854 when a water-well drilled in Stockton supplied both gas and water. The first commercial gas deliveries, made in 1935, came from the Tracy gas field. In 1986 there were 13 producing gas fields in San Joaquin County. One hundred eighteen wells situated on these fields produced approximately 21.9 billion cubic feet (MMcf) of natural gas (see Table IV.B-4).¹⁰ Overall there are 21 natural gas fields in San Joaquin County which either are active or produced gas in the past, as shown in Figure IV.B-3.

Most natural gas extraction activities in San Joaquin County take place in the vicinity of the Delta. The Lathrop, McDonald Island, and Union Island gas fields account for a majority of all the natural gas extracted from the County. In recent years, the Union Island gas field has been most active producing over 50% of the countywide annual production.¹¹ During 1988, annual production from the Union Island gas field reached 1.4 million cubic feet, over 63% of the County's annual gas production.¹⁰

The Department of Conservation, Division of Oil and Gas, estimates the quantity of natural gas reserves remaining in each gas field. Estimated gas reserves are greatest in the Union Island gas field (83,298 MMcf) and the Lathrop gas field (29,558 MMcf). An estimate of the total County reserves as of December 31, 1986 was 131.2 billion cubic feet (MMcf). ¹²

In addition to the extraction of natural gas, there is a gas storage project on McDonald Island operated by Pacific Gas and Electric (PG&E). Since 1959, PG&E has purchased gas, transported it to McDonald Island, and injected it into the field for storage.

TABLE IV.B-4: NATURAL GAS EXTRACTION IN SAN JOAQUIN COUNTY

<u>Year</u>	Net Gas Extracted Billion Cubic Feet (MMcf)	<u>Year</u>	Net Gas Extracted Billion cubic Feet (MMcf)
1964	43,598	1976	30,270
1965	45,474	1977	32,044
1966	36,809	1978	30,732
1967	26,588	1979	23,083
1968	34,833	1980	23,565
1969	40,636	1981	28,443
1970	43,936	1982	18,791
1971	42,322	1983	17,897
1972	55,858	1984	16,548
1973	43,834	1985	22,344
1974	17,614	1986	21,887
1975	15,814	1987	23,398

Source:

California Resources Agency, Department of Conservation, Division of Oil and Gas, <u>Summary of Operations - Oil, Gas and Geothermal Production Statistics</u>, 1964-1973, <u>Annual Report of the State Oil and Gas Supervisor</u>; 1974-1987, personal communication with the Division of Oil and Gas.

Potential Hazards. Throughout the history of natural gas extraction in San Joaquin County, there has only been one major accident. An explosion at the McDonald Island field occurred in 1974 and the resultant fire continued for 19 days and burned 14.8 Mmcf of natural gas. Although the likelihood of accidents or hazards are slight, they include gas seepage from the deposit or the pipelines, blowouts (mud, sand, gravel, rocks, water, gas or a mixture of these) while drilling the well, contamination of waterways or water supplies from wastewater disposal and subsidence over a gas field. Blowouts and fires can have particularly dangerous results including damage to property, loss of the resource, human injury, and disruption of surface land uses.

Regulation and Controls. The State Department of Conservation, Division of Oil and Gas regulates the drilling, operation, maintenance and abandonment of gas wells to prevent damage to the gas and other resources as a result of such operations. The State also requires that applicants for natural gas

extraction post a surety bond to cover the cost of potential environmental damage. In addition, individuals who wish to engage in oil or gas drilling within San Joaquin County must obtain permits from local authorities.

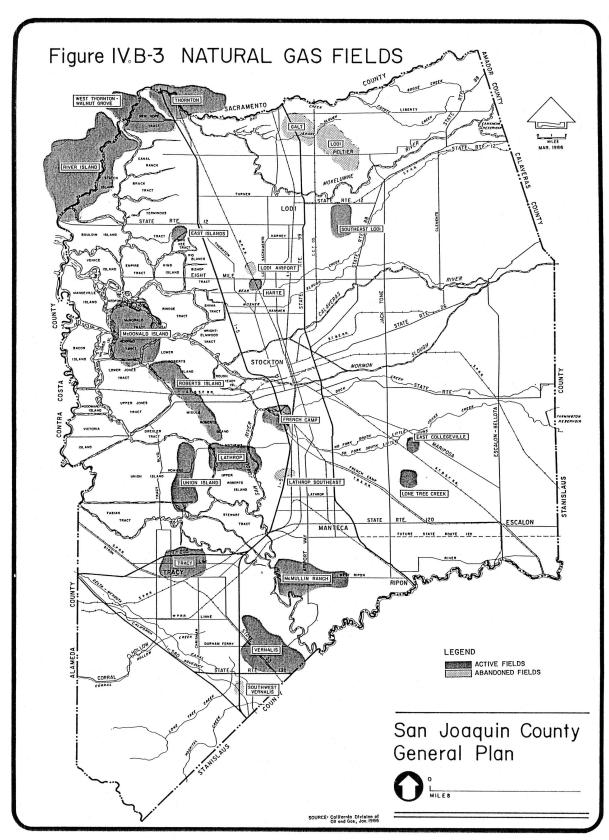
Future of the Industry. Currently producing natural gas reserves in San Joaquin County are expected to be depleted by the end of the 20th century. However, new fields and pools are being discovered through exploration and drilling.10 Chevron U.S.A., Inc. has completed enough exploratory drilling in the field to know that there is natural gas below Stockton. Current exploration activity will help determine whether there are commercial quantities of gas in the Stockton field.¹³

The McDonald Island Gas Storage Project will continue operation. PG&E reports plans to drill new wells on the island and increase the natural gas extraction rate through technological improvements. The utility company also has plans for installing another pipeline so that its natural gas carrying capacity will increase with the expected increase in extraction.¹⁴

4. OTHER MINERAL RESOURCES

Other natural resources withdrawn from San Joaquin County include gold, peat, and silver. Many of the San Joaquin County rivers and creeks were dredged for gold in the years following the 1849 gold rush. The significant gold deposits have all been extracted, and today gold is found only as a secondary product of sand and gravel processing.

Peat soil removal has occurred since 1971. The Delta Humus Company removes the peat soil from a flooded portion of Venice Island and sells it to local growers and others who package the nutritional soil for the retail market. The Delta Humus Company is one of California's two producers/extractors of peat soil.²



En

dnotes

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- 3. Surface Mining and Reclamation Act of 1975, Article 1, Section 2712.
- 4. San Joaquin County. <u>San Joaquin County Planning Title</u>, <u>Zoning and Subdivision Regulations</u>, Section 9-2240.
- 5. California Department of Conservation, Division of Mines and Geology. <u>Mineral Land Classification of Portland Cement Concrete Aggregate in the Stockton-Lodi Production-Consumption Region, Special Report 160</u>. 1988. P. 24.
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- 7. California Department of Conservation. Special Report 160. 1988.
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- 11. California Department of Conservation, Division of Oil and Gas. <u>Annual Report of the State Oil and Gas Supervisor</u>. 1974 1982.
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References

1. San Joaquin County Planning Department. <u>A Review of San Joaquin County's Extractive Industries, Preliminary Draft</u>. February 1969.